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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/809,402 | 03/26/2004 | Cristian E. Anghel | H0005161/2929-0229P | 7541 |

7590 10/04/2005

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| EXAMINER |
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MOFFAT, JONATHAN

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| ART UNIT | PAPER NUMBER |
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2863

DATE MAILED: 10/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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|------------------------------|--------------------------------------|--------------------------------------|--|
| Office Action Summary | Application No. 10/809,402 | Applicant(s) ANGHEL ET AL. | |
| | Examiner Jonathan Moffat | Art Unit 2863 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 6/20/2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>03/26/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

Claim 1 is objected to because of the following informalities: Although the intention is understood by the examiner and is common language in the art, the term “sensor less” should not be used in the claims. For matters of claimed invention, there are “sensors” of sorts although they do not measure the quantity of interest directly. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 13, 14-17, and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Patel (US pat 6,163,127).

With respect to claims 1 and 14, Patel discloses a method and associated apparatus comprising:

1) A first rotor position determining unit for generating first rotor position values by applying a first sensor less rotor position calculation technique, which emulates a resolver (column 3 lines 48-54).

2) A second rotor position deriving unit for generating second rotor position values by applying a second sensor less rotor position calculation technique (column 3 lines 63-67).

3) A rotor position result output unit for outputting rotor position results over a range of rotor speeds as a function of said first rotor position values, said second rotor position values, and rotor speed (column 4 lines 1-5 and Fig 3).

With respect to claims 2 and 15, Patel discloses a control unit for controlling said rotor position output unit as a function of rotor speed (Fig 1 item 13 and Fig 3).

With respect to claims 3 and 16, Patel discloses:

1) Said rotor position result output unit outputs said first rotor position values as rotor position results during a first operating mode (Fig 3).

2) Said rotor position result output unit outputs said second rotor position values as rotor position results during a second operating mode (Fig 3).

With respect to claims 4 and 17, Patel discloses that said rotor position result output unit operates in said first operating mode at low rotor speeds and operates in said second operating mode at higher rotor speeds (Fig 3).

With respect to claims 13 and 26, Patel discloses that the second sensor less rotor position calculation technique calculate rotor position based on back EMF (column 3 lines 63-67).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Patel as applied to claims 3 and 16 above in view of Caroboiante (EP 0 558 261).

With respect to claims 5 and 18, Patel discloses a control unit for controlling said rotor position result output unit as a function of rotor speed (Fig 3).

Patel fails to disclose using a phase-locked loop method to compensate the first method during a third operating mode.

Caroboiante teaches that said rotor position result output unit outputs said first rotor position values as rotor position results during a third operating mode and executes a phase-locked loop operation to control said second rotor position deriving unit during said third operating mode such that errors between second rotor position values and first rotor position values are reduced (Fig 3 and column 6).

It would have been obvious to one of ordinary skill in the art to add a third transition mode to the method and system of Patel as suggested by Caroboiante. This will prevent any spikes or other erroneous data associated with the switch between the two position methods allowing for a smooth transition (Patel column 4 lines 1-5).

Claims 6-7 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Patel as applied to claims 3 and 16 above in view of Quirion (US pat pub 20050151502).

With respect to claims 6 and 19, Patel discloses a smooth transition method between the first and second operating modes (column 4 lines 1-5)

Patel fails to disclose a weighted combination of the two.

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Quirion teaches said rotor position result output unit outputs a weighted combination of first and second rotor position values during a transitional operating mode (pg 3 section 0065 and Fig 6).

It would have been obvious to one of ordinary skill in the art to implement the smooth transition of Patel by using a weighted combination of both methods as does Quirion. This weighted combination will allow for one method to be more heavily relied upon than the other which is obvious in the light of EMF being a more reliable method over a larger range of speeds.

With respect to claims 7 and 20, Patel discloses a smooth transition method between the first and second operating modes (column 4 lines 1-5).

Patel fails to disclose weighting the second method more heavily than the first.

Quirion teaches a weighted combination such that the second rotor position values are given more weight as rotor speed increases (pg 4 section 0068).

It would have been obvious to one of ordinary skill in the art to implement the smooth transition of Patel by using the weighted combination of both methods as does Quirion. This weighted combination will allow for one method to be more heavily relied upon than the other which is obvious in the light of EMF being a more reliable method over a larger range of speeds.

Claims 8, 11-12 and 21, 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Patel as applied to claims 1 and 14 above in view of Jansen (US pat 5,585,709).

With respect to claims 8 and 21, Patel fails to disclose a first position deriving unit comprising a band-pass filter and converter.

Jansen teaches a unit and method comprising:

1) A band-pass filter that filters phase voltage signals output from main stator windings of said synchronous machine during AC excitation, thereby extracting a rotor position-indicating component from said phase voltage signals (Fig 4a item 87 and Fig 4b item 94).

2) A converter that converts the filtered phase voltages into balanced two-phase quadrature signals, said balanced two-phase quadrature signals indicating positioning of said rotor (Fig 1 item 43).

It would have been obvious to one of ordinary skill in the art to use the system and method of Jansen as the resolver emulating system and method of Patel in order to derive an accurate reading of low speed rotor position.

With respect to claims 11 and 24, Patel discloses said first method emulating a position sensor (column 3 lines 48-54).

Patel fails to disclose a two-phase quadrature signal.

Jansen teaches that the two-phase quadrature signals are used as inputs to emulate a position sensor in a drive system of the synchronous machine (column 6 line 66 – column 7 line 9).

It would have been obvious to one of ordinary skill in the art to use the system and method of Jansen as the resolver emulating system and method of Patel in order to derive an accurate reading of low speed rotor position.

With respect to claims 12 and 25, Patel discloses that the first method signals emulate a resolver (column 3 lines 48-54).

Patel fails to disclose using two-phase quadrature signals.

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Jansen discloses two-phase quadrature signals used as inputs (column 6 line 66- column 7 line 9).

It would have been obvious to one of ordinary skill in the art to use the system and method of Jansen as the resolver emulating system and method of Patel in order to derive an accurate reading of low speed rotor position.

Claims 9-10 and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Patel as applied to claims 1 and 14 above in view of Rozman (US pat 5,493,200).

With respect to claims 9 and 22, Patel discloses a synchronous machine.

Patel fails to disclose said synchronous machine be brushless.

Rozman teaches said synchronous machine is a synchronous brushless machine (column 1 lines 5-7).

It would have been obvious to one of ordinary skill in the art to apply the method and apparatus of Patel to a brushless system in place of the system of Rozman. The system of Patel requires no modification to work with a brushless motor and application to multiple types of motors would make the system of Patel more robust.

With respect to claims 10 and 23, Patel fails to disclose measuring position of a rotor in a gas turbine engine.

Rozman teaches said rotor is on a shaft coupled to a gas turbine engine of an aircraft (column 1 lines 10-30).

It would have been obvious to one of ordinary skill in the art to apply the method and apparatus of Patel in the application of Rozman. It is common in the art to monitor the rotor of a

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startup motor coupled to a gas turbine (Rozman) in order to monitor startup speeds and energy.

This would require not modification of the system and method of Patel.

Conclusion

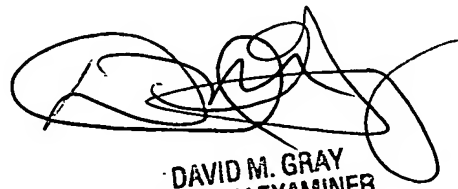
The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Schulz (US pat 6,924,617) discloses a system similar to applicant's disclosed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Moffat whose telephone number is (571) 272-2255. The examiner can normally be reached on Mon-Fri, from 7:15-3:45.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on (571) 272-2269. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JM



DAVID M. GRAY
PRIMARY EXAMINER